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10/798,180	03/11/2004	Torsten Niederdrank	P04,0073	5312

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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/798,180	NIEDERDRANK, TORSTEN	
	Examiner	Art Unit	
	Fatimat O. Olaniran	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *All*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 8 and 14 are objected to because of the following informalities:

Claim 8 line 7 "said second and third microphones" lacks antecedent basis.

Claim 14 line 11 "pair or said first", "or" is considered a typo and according to line 8 of the same claim, line 11 should read, "pair of said first". Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al (5463694) in view of Baekgaard (6272229).

Claim 1 Bradley discloses, a directional microphone system having at least three omnidirectional microphones (col. 3 line 62-65), wherein said at least three omnidirectional microphones are electrically connected in respective pairs to form a first directional microphone of the first order and a second directional microphone of the first order (col. 5 line 29-34). Bradley does not disclose a method for automatically equalizing microphone signals said method comprising the steps of: equalizing

respective amplitudes of respective microphone signals generated by said omnidirectional microphones; and equalizing respective amplitudes of respective microphone signals generated by said first and second directional microphones of the first order by phase shifting the microphone signal generated by at least one of the omnidirectional microphones.

Baekgaard discloses a method for automatically equalizing microphone signals said method comprising the steps of: equalizing respective amplitudes of respective microphone signals (Fig. 5: adaptive sensitivity matching) generated by said microphones; and equalizing respective amplitudes of respective microphone signals generated by said microphones by phase shifting (Fig. 5, col. 4 line 13-16 and line 37-42) the microphone signal generated by at least one of the microphones. Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the omnidirectional microphone system of Bradley with the amplitude equalization method of Baekgaard in order to match the microphone sensitivities.

Claim 2 Bradley further discloses, embodying said directional microphone system in a hearing aid device (col. 7 line 53-54) having a housing (Fig. 5) with at least three sound entrance ports respectively associated with said at least three omnidirectional microphones (Fig. 5 col. 7 line 38-40); and disposing said at least three sound entrance ports along a substantially straight line and with a same spacing between adjacent sound entrance ports (col. 4 line 60-61).

4. Claim 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al (5463694) in view of Baekgaard (6272229) in further view of Baumhauer Jr. et al (5515445).

Claim 3 analyzed with respect to claim 1, Bradley in view of Baekgaard disclose wherein each of said omnidirectional microphones has a signal transfer function associated therewith (inherent, microphones are transducers and therefore have signal transfer functions). Bradley in view of Baekgaard do not disclose and wherein the step of equalizing respective amplitudes of respective microphone signals generated by said at least three omnidirectional microphones comprises the steps of: for each of said at least three omnidirectional microphones, measuring a temporal average of acoustic field energy detected by that omnidirectional microphone; and adapting the respective signal transfer functions of the at least three omnidirectional microphones dependent on the temporally averaged acoustic field energy measured for each of said at least three omnidirectional microphones to equalize the temporally averaged acoustic field energy for all of said omnidirectional microphones.

Baumhauer Jr. discloses wherein the step of equalizing respective amplitudes of respective microphone signals generated by said at least three omnidirectional microphones comprises the steps of: for each of said at least three omnidirectional microphones (Fig. 5 microphone array), measuring a temporal average of acoustic field energy detected by that omnidirectional microphone (col. 1 line 54-61); and adapting the respective signal transfer functions of the at least three omnidirectional microphones

dependent on the temporally averaged acoustic field energy measured for each of said at least three omnidirectional microphones to equalize the temporally averaged acoustic field energy for all of said omnidirectional microphones (col. 1 line 54-61). Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley in view of Baekgaard with the balancing network of Baumhauer Jr. in order to reduce time, cost and labor as taught by Baumhauer Jr. (col. 1 line 19-20 and line 34-35).

Claim 4 analyzed with respect to claim 3 and claim 1, Baumhauer Jr. further discloses wherein the step of measuring the temporally averaged acoustic field energy (col. 1 line 54-61) comprises, for each of said at least three omnidirectional microphones (Fig. 5 array), measuring a signal level of the microphone signal from that omnidirectional microphone (col. 4 line 10-13).

Claim 5 analyzed with respect to claim 3 Bradley further discloses wherein the step of adjusting the respective signal transfer functions comprises multiplying the respective microphone signals generated by the at least three omnidirectional microphones with respective weighting factors (col. 6 line 26-30).

Claim 6 analyzed with respect to claim 1, Bradley in view of Baekgaard disclose wherein each of said first and second directional microphones of the first order has a signal transfer function associated therewith (Bradley; col. 5 line 38-43). Bradley in view

of Baekgaard do not disclose and wherein the step of equalizing respective amplitudes of respective microphone signals generated by said first and second directional microphones of the first order comprises the steps of: for each of said first and second directional microphones of the first order, measuring a temporal average of acoustic field energy detected by that directional microphone of the first order; and adapting the respective signal transfer function of at least one of the first an second directional microphones of the first order dependent on the temporally averaged acoustic field energy measured for each of said first and second directional microphones of the first order to equalize the temporally averaged acoustic field energy for both of said first and second directional microphones of the first order.

Baumhauer discloses and wherein the step of equalizing respective amplitudes (col. 1 line 54-61) of respective microphone signals generated by said first and second directional microphones of the first order comprises the steps of: for each of said first and second directional microphones of the first order, measuring a temporal average of acoustic field energy detected by that directional microphone of the first order; and adapting the respective signal transfer function of at least one of the first an second directional microphones of the first order dependent on the temporally averaged acoustic field energy measured for each of said first and second directional microphones of the first order to equalize the temporally averaged acoustic field energy for both of said first and second directional microphones of the first order (col. 1 line 54-61).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley with the balancing network of Baumhauer Jr. in order to reduce time, cost and labor as taught by Baumhauer Jr. (col. 1 line 19-20 and line 34-35).

Claim 7 analyzed with respect to claim 6 and claim 1, Bradley in view of Baekgaard in further view of Baumhauer Jr. discloses wherein the step of measuring the temporally averaged acoustic field energy comprises, for both of said first and second directional microphones of the first order (Bradley; col. 5 line 38-43), measuring a signal level of the microphone signal from that directional microphone of the first order (Baumhauer Jr.; col. 1 line 54-61).

5. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al. (5463694) in view of Baekgaard (6272229) in further view of Hagen et al. (6389142).

Claim 8 Bradley in view of Baekgaard discloses wherein said at least three omnidirectional microphones include a first omnidirectional microphone, a second omnidirectional microphone and a third omnidirectional microphone (Bradley; col. 3 line 62-65), and wherein said method comprises the steps of:

electrically connecting said first and second omnidirectional microphones to form said first directional microphone of the first order (Bradley; col. 5 line 29-34);

electrically connecting said second and third microphones to form said second

directional microphone of the first order (Bradley; col. 5 line 29-31);

electrically connecting said first and second directional microphones of the first order to form a directional microphone of the second order (Bradley; col. 5 line 35-37) and re-equalizing the respective amplitudes of the first and second directional microphones of the first order by phase shifting the microphone signal generated by one of said second and third omnidirectional microphones (Baekgaard; col. 3 line 37-41 and col. 4 line 13-16). Bradley in view Baekgaard do not disclose phase shifting the microphone signal generated by one of the first and second omnidirectional microphones to reduce the amplitude of the microphone signal generated by the first directional microphone of the first order with respect to the amplitude of the microphone signal generated by the second directional microphone of the first order.

Hagen discloses phase shifting the microphone signal generated by one of the first and second omnidirectional microphones to reduce the amplitude of the microphone signal generated by the first directional microphone of the first order with respect to the amplitude of the microphone signal generated by the second directional microphone of the first order (col. 5 line 67 and col. 6 line 1-4, "phase delay 54 of the output mic B may be adjusted relative to the output of microphone mic F). Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the omnidirectional microphone array of Bradley in view of Baekgaard with the phase shifter of Hagen in order to vary the polar directivity pattern of the array as taught by Hagen (col. 6 line 6-7).

Claim 9 analyzed with respect to claim 8 and claim 1, Bradley in view of Baekgaard in further view of Hagen further disclose wherein the step of phase shifting (Hagen; Fig. 4 element 54 and 56) the microphone generated by one of said first and second omnidirectional microphones (Bradley col. 3 line 62-64) comprises phase shifting the microphone signal generated by one of the first and second omnidirectional microphones within a predetermined range (Hagen; col. 7 line 1-4) to minimize the microphone signal generated by the first directional microphone of the first order with respect to the amplitude of the microphone signal generated by the second directional microphone of the first order (Hagen; col. 5 line 67 and col. 6 line 1-4).

Claim 10 analyzed with respect to claim 8 and claim 1, Bradley in view of Baekgaard in further view of Hagen further disclose comprising iteratively repeating the phase shifting of the microphone signal generated by one of microphones and the phase shifting of the microphone signal generated by one of the microphones until a predetermined difference between the respective amplitudes of the first and second microphones of the is achieved for successive iterations (Baekgaard; col. 3 line 37-42).

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al. (5463694) in view of Baekgaard (6272229) in further view of Allred et al. (7092537).

Claim 11 analyzed with respect to claim 1, Bradley in view of Baekgaard disclose omnidirectional microphones (Bradley; col. 3 line 62-64). Bradley in view of Baekgaard

does not disclose comprising dividing the microphone signals generated by the respective omnidirectional microphones into frequency bands, and wherein the step of equalizing respective amplitudes of respective microphone signals generated by the omnidirectional microphones comprises compensating respective amplitudes of respective microphone signals generated by the omnidirectional microphones in each frequency band, and wherein the step of compensating respective amplitudes of respective microphone signals generated by the first and second directional microphones of the first order comprises compensating respective amplitudes of respective microphone signals generated by said first and second directional microphones of the first order in each of said frequency bands.

Allred discloses comprising dividing the microphone signals generated by the respective microphones into frequency bands (col. 1 line 53-54), and wherein the step of equalizing respective amplitudes of respective microphone signals generated by the microphones comprises compensating respective amplitudes of respective microphone signals generated by the omnidirectional microphones in each frequency band (col. 1 line 58-60), and wherein the step of compensating respective amplitudes of respective microphone signals generated by the first and second microphones of the comprises compensating respective amplitudes of respective microphone signals generated by said first and second microphones in each of said frequency bands (col. 1 line 58-60).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the omnidirectional microphone system of Bradley in view of Baekgaard with the equalizers of Allred in order to equalize the sound output.

7. Claim 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al. (5463694) in view of Baekgaard (6272229) in further view of Baumhauer Jr. et al (5515445).

Claim 12 analyzed with respect to claim 1 Bradley in view of Baekgaard disclose a directional microphone system comprising:

a first omnidirectional microphone, a second omnidirectional microphone and a third omnidirectional microphone, each of said first, second and third omnidirectional microphones generating a microphone signal having a signal level (Bradley; col. 3 line 62-64); a first pair of said first, second and third omnidirectional microphones being electrically connected to form a first directional microphone of the first order (Bradley; col. 5 line 29-37); a second, different pair or said first, second and third omnidirectional microphones being electrically connected to form a second directional microphone of the first order (Bradley; col. 5 line 29-37), each of said first and second directional microphones of the first order generating a microphone signal having a signal level (Bradley; col. 5 line 38-40); and a phase control unit (Baekgaard; col. 3 line 2-3) connected to adjust a phase of the respective microphone signal generated by at least of said first, second and third omnidirectional microphones dependent on the respective signal levels measured by the fourth and fifth level measurement devices (Baekgaard; Fig. 6 col. 4 line 26-30).

Bradley in view of Baekgaard do not disclose first, second and third level measurement units respectively connected following said first, second and third omnidirectional microphones for measuring the respective signal levels of the microphone signals

respectively generated by said first, second and third omnidirectional microphones;

a plurality of amplitude control units respectively connected to adjust the amplitudes of at least two of the respective microphone signals from the first, second and third omnidirectional microphones dependent on the respective signal levels measured by said first, second and third level measurement units;

fourth and fifth level measurement units respectively connected subsequent to said first and second directional microphones of the first order for measuring respective levels of the respective microphone signals generated by the first and second directional microphones of the first order;

Baumhauer Jr. discloses first, second and third level measurement units respectively connected following said first, second and third omnidirectional microphones (col. 2 line 51-53) for measuring the respective signal levels of the microphone signals respectively generated by said first, second and third omnidirectional microphones (col. 4 line 10-13); a plurality of amplitude control units (col. 3 line 14-17) respectively connected to adjust the amplitudes of at least two of the respective microphone signals from the first, second and third omnidirectional microphones, dependent on the respective signal levels measured by said first, second and third level measurement units (col. 4 line 29-32); fourth and fifth level measurement units respectively connected subsequent to said first and second directional microphones of the first order for measuring respective levels of the respective microphone signals generated by the first and second directional microphones of the first order (col. 4 line 10-13).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley in view of Baekgaard with the balancing network of Baumhauer Jr. in order to reduce time, cost and labor as taught by Baumhauer Jr. (col. 1 line 19-20 and line 34-35).

Claim 13 analyzed with respect to claim 12 and claim 1, Bradley in view of Baekgaard in further view of Baumhauer Jr. disclose comprising a plurality of phase control devices for respectively adjusting phases of respective microphone signals generated (Baekgaard; Fig. 6 col. 4 line 26-30) by at least two of said first, second and third omnidirectional microphones (Bradley; col. 3 line 62-65) dependent on the respective signal levels measured by said fourth and fifth level measurement devices (Baumhauer Jr; col. 4 line 10-13).

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable as being unpatentable over Bradley et al. (5463694) in view of Baumhauer Jr. et al (5515445) in further view of Baekgaard (6272229).

Claim 14 Bradley discloses a housing having first, second and third sound entrance ports a directional microphone system in said housing comprising a first omnidirectional microphone and a second omnidirectional microphone and a third omnidirectional microphone respectively associated with said first, second and third sound entrance ports, each of said first, second and third omnidirectional microphones (col. 3 line 62-64, Fig. 5, col. 7 line 34-38); generating a microphone signal having a signal level, a first

pair of said first, second and third omnidirectional microphones being electrically connected to form a first directional microphone of the first order (col. 5 line 29-37), a second, different pair or said first, second and third omnidirectional microphones being electrically connected to form a second directional microphone of the first order (col. 5 line 29-37), each of said first and second directional microphones of the first order generating a microphone signal having a signal level (col. 5 line 38-40).
a signal processor in said housing (Fig. 1:processor 107) for processing the respective microphone signals from said first and second directional microphones of the first order to produce a processed signal (col. 7 line 38-41); and an earphone in said housing for transducing said processed signal to form an acoustic output signal (col. 7 line 54).

Bradley does not disclose first, second and third level measurement units respectively connected following said first, second and third omnidirectional microphones for measuring the respective signal levels of the microphone signals respectively generated by said first, second and third omnidirectional microphones, a plurality of amplitude control units respectively connected to adjust the amplitudes of at least two of the respective microphone signals from the first, second and third omnidirectional microphones dependent on the respective signal levels measured by said first, second and third level measurement units, fourth and fifth level measurement units respectively connected subsequent to said first and second directional microphones of the first order for measuring respective levels of the respective microphone signals generated by the first and second directional microphones of the first order, and a phase control unit

connected to adjust a phase of the respective microphone signal generated by at least of said first, second and third omnidirectional microphones dependent on the respective signal levels measured by the fourth and fifth level measurement devices;
a signal processor in said housing for processing the respective microphone signals from said first and second directional microphones of the first order to produce a processed signal; and an earphone in said housing for transducing said processed signal to form an acoustic output signal.

Baumhauer Jr. discloses first, second and third level measurement units respectively connected following said first, second and third omnidirectional microphones for measuring the respective signal levels of the microphone signals respectively generated by said first, second and third omnidirectional microphones (col. 4 line 10-13), a plurality of amplitude control units (col. 3 line 14-17) respectively connected to adjust the amplitudes of at least two of the respective microphone signals from the first, second and third omnidirectional microphones dependent on the respective signal levels measured by said first, second and third level measurement units (col. 4 line 29-32), fourth and fifth level measurement units respectively connected subsequent to said first and second directional microphones of the first order for measuring respective levels of the respective microphone signals generated by the first and second directional microphones of the first order (col. 4 line 10-13).
Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley with the balancing network of

Baumhauer Jr. in order to reduce time, cost and labor as taught by Baumhauer Jr. (col. 1 line 19-20 and line 34-35).

Bradley in view of Baumhauer Jr. do not disclose and a phase control unit connected to adjust a phase of the respective microphone signal generated by at least of said first, second and third omnidirectional microphones dependent on the respective signal levels measured by the fourth and fifth level measurement devices;
a signal processor in said housing for processing the respective microphone signals from said first and second directional microphones of the first order to produce a processed signal; and an earphone in said housing for transducing said processed signal to form an acoustic output signal.

Baekgaard discloses a phase control unit connected (col. 3 line 2-3) to adjust a phase of the respective microphone signal generated by at least of said first, second and third omnidirectional microphones dependent on the respective signal levels measured by the fourth and fifth level measurement devices (Fig. 6 col. 4 line 26-30);
Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley in view of Baumhauer Jr. with the matching circuitry of Baekgaard in order to have long term matching of the microphone system sensitivities as taught by Baekgaard (col. 2 line 6-13).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fatimat O. Olaniran whose telephone number is 571-270-3437. The examiner can normally be reached on M-F Alt F off 8:30-6 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hai Tran can be reached on 571-272-7305. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

FO

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PRIMARY EXAMINER